

Traumatic Pseudoaneurysms of the Common Carotid and Vertebral Artery in a Four-Year-Old Child

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Key words: pseudoaneurysms, balloon occlusion, parent artery occlusion

Summary

Pseudoaneurysms of the neck arteries are rare lesions usually traumatic and less frequently infectious in origin. They are often described as case reports. We describe here an unusual occurrence of pseudoaneurysms in the common carotid and vertebral artery in a four-year-old child victim of a stab wound in the neck treated by parent artery occlusion of the vertebral and common carotid arteries.

Case Report

A four-year-old boy victim of a criminal stabbing in the abdomen and neck was operated urgently by resection anastomosis due to severe intestinal injury. There were two neck wounds which were sutured. One week later he developed disturbed consciousness level with right side hemiplegia and aphasia. On examination, two pulsatile masses were noted at the left side of the neck with pulsatile bruit on auscultation. MRI revealed left parietal ischemia. Duplex study revealed a giant left common carotid artery (CCA) and a large vertebral artery aneurysms measuring 28 and 22 mm respectively in maximum diameter. This was confirmed by CT and CTA examination of the neck. The child was put on low molecular weight heparin and gradually improved. He was referred to our Institute one month later for management. The preprocedure neurological examination revealed grade 3/5 motor power for the right

upper limb and grade 4/5 for the lower limb with aphasia recovery. After discussion with our vascular surgery team, the decision was taken to try endovascular treatment first as surgical interference was thought to be more risky.

Technique

Under general anesthesia, bifemoral punctures were performed under ultrasound guidance using a micropuncture peel-away introducer set (Cook Medical, Ireland). 5F arterial introducers were inserted. Using an Envoy 5F (Cordis, Miami, FL, USA), selective catheterization of the left CCA and left vertebral artery confirmed the duplex and CTA findings. A GoldBal 2 balloon (Balt extrusion, Montmorency, France) was used first proximal to the vertebral aneurysm just after the origin, kept in place inflated to the maximum with 0.6 cc diluted contrast without detachment. Angiographic assessment of the contralateral vertebral, thyrocervical and costocervical trunks was performed. No filling of the aneurysm was noted with normal vascularisation of the posterior circulation from the right vertebral artery including the left pica. The left vertebral artery was opacified via anastomosis with the ascending and deep cervical arteries at C5 and C3 levels with no aneurysm filling. At this stage the balloon was detached.

The left common carotid was catheterized; temporary balloon occlusion test was performed. Filling of the left ICA was ensured



Figure 1 CT neck sagittal reconstruction shows both aneurysms.



Figure 2 Left common carotid angiography AP view shows a giant aneurysm.

through a large Pcom together with a well-functioning Acom. No significant delay in the vascularisation of both hemispheres was noted. The aneurysm was then trapped by two detachable balloons (GoldBal2). The procedure was done under systemic heparinisation targeting an ACT of 250 – 300 seconds.

The patient recovered with no new neurological consequences. He was kept on systemic heparinisation for 24 hours. He was discharged 48 hours later pursuing physiotherapy.

Clinical and radiological follow-up

The child was examined at the two months consultation and was stable. The duplex examination done one month following the procedure revealed no intra-aneurysmal flow checked by colour examination mode and duplex wave signal.

Discussion

Pseudoaneurysms affecting neck arteries are rare lesions often described as case reports, generally traumatic in origin. Iatrogenic causes have been described following surgery or central venous catheter insertion¹. Pseudoaneurysms arise when a tear occurs between the media and the adventitia² and hence the aneurysm wall is made primarily of a hematoma. The main difference between true and pseudoaneurysm is the lack of adventitia in pseudoaneurysm where the whole wall is lacerated. Traumatic injury to the vertebral artery is rarer due to its anatomical bony protection. Few reports describing pseudoaneurysms in the pediatric age group were found in the English literature³⁻⁵. To our knowledge this is the first report describing two pseudoaneurysms affecting the vertebral and the common carotid arteries in this age group. This patient presented with a



Figure 3 Left vertebral angiography AP view shows the aneurysm.



Figure 4 Left subclavian angiography AP view post occlusion of the left vertebral artery shows retrograde opacification of the vertebral artery via anastomosis with the ascending cervical and costocervical arteries.

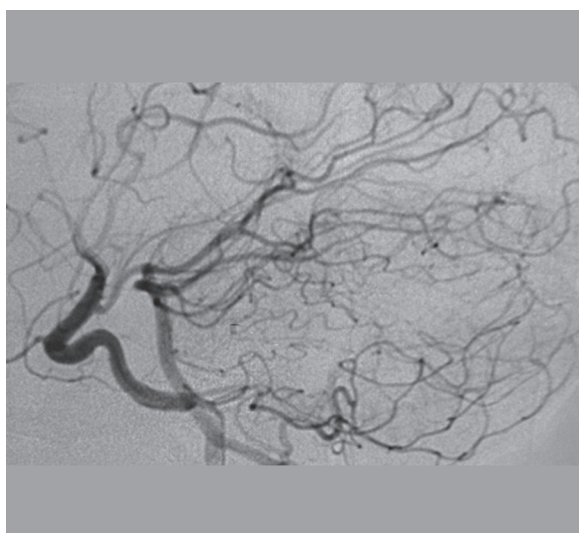


Figure 5 RT vertebral angiography post occlusion of the vertebral and common carotid arteries shows filling of the internal carotid artery via the posterior communicating artery.

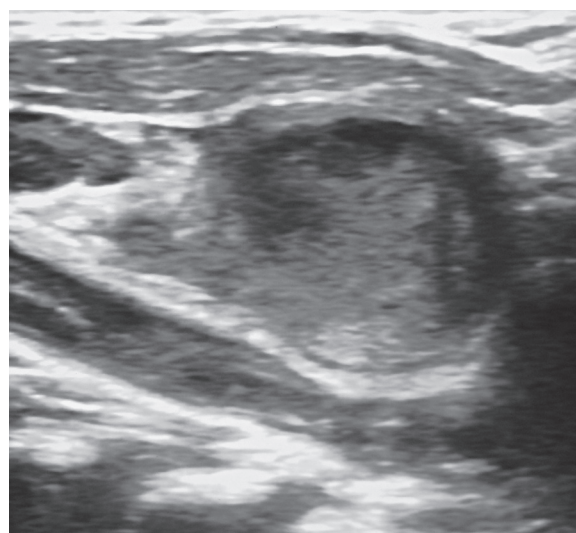
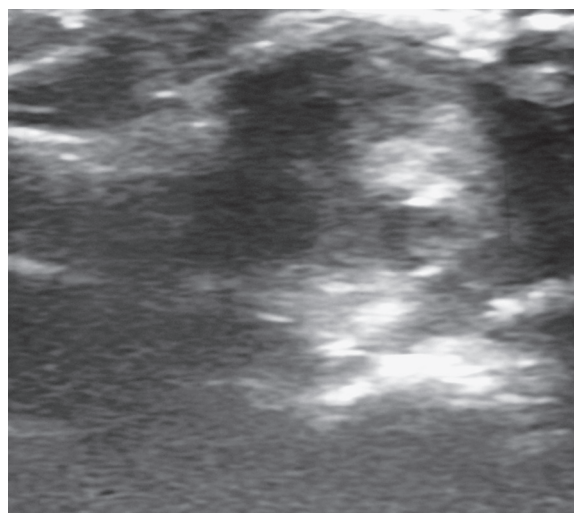


Figure 6 B mode US shows thrombosed aneurysm of the common carotid artery.

Figure 7 B mode US shows thrombosed aneurysm of the vertebral artery.



left middle cerebral artery territory infarction one week after the event. This is most likely embolic originating from the common carotid aneurysm. The clinical presentations of pseudoaneurysms vary from neck pain, pulsatile swelling or embolic TIA or stroke. Patients may start to be symptomatic up 30 days according to Beena et al.³. The surgical option was discussed with the vascular surgeons and was found technically demanding with the need for sternal splitting. In this case there were three possible endovascular therapeutic options: 1- Parent artery occlusion if tolerated; 2- Bare stent and coiling; 3- Graft stent. The decision was taken to sacrifice the parent artery if possible as the first therapeutic option.

Embolization of acute pseudoaneurysms using coils may carry the risk of perforation due to the fragility of the wall⁶. Crow et al. described a case of massive epistaxis following balloon occlusion of carotid pseudoaneurysm after balloon extrusion through the aneurysm wall⁷. Although these two aneurysms have been treated in the subacute phase and theoretically the aneurysm wall is supposed to be more mature allowing possible coiling, we did not consider this for two reasons. First, the patient tolerated the occlusion test well and we believe that parent artery occlusion will offer an effective and long-lasting treatment for dissecting pseudoaneurysms. Second, recurrence after coiling of pseudoaneurysms is not uncommon even with stent support. MacKay et al. described a case of intradural vertebral pseudoan-

eurysm recurrence six weeks after coiling and insertion of two stents in the front of the neck. They ended by vertebral artery sacrifice at the level of the dissection using coils⁸.

Lee et al. described a case of subarachnoid hemorrhage rebleeding in a 15-year-old child with dissecting posterior cerebral artery aneurysm treated by stent-assisted coiling. The patient rebled six hours after the procedure and segmental vessel occlusion was performed⁹. Reports describing stent insertion in a growing child are scanty and long-term follow-up is not well-known. Ruckert et al. deployed a graft stent in a 13-year-old child with a vertebrojugular arteriovenous fistula. They pointed to the long-term potential complications of a graft stent in the vertebral artery accommodating to rotation and neck flexion. Also the possibility of neointimal hyperplasia, arterial narrowing, thrombosis or embolic events is another concern in graft stent with subsequent possible brain stem infarction¹⁰. This patient practically lost his left common carotid artery only as the left vertebral was reconstituted via anastomosis with the ascending and deep cervical arteries at C5 and C3 respectively.

Conclusion

In this case occlusion of both vertebral and common carotid arteries was feasible and efficient in excluding both pseudoaneurysms with no neurological drawbacks.

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